

PROACT FACT SHEET



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Composting

In nature, dead organic matter is attacked by soil microorganisms such as bacteria and fungi, as well as invertebrates such as worms and insects, which use the material for energy and nutrients causing the matter to decompose into a nutrient rich soil supplement. Through composting, naturally occurring decay mechanisms are controlled and encouraged to break down organic matter into compost, a relatively stable organic product that improves soil structure, aeration, and water retention. This natural form of recycling is an inexpensive and ecologically sound waste management method capable of diverting tons of municipal solid waste from landfills.

The Fundamentals

A compost pile is a living community of organisms that require air, warmth, water, and a “balanced diet.” In order to sustain efficient decomposition, *five fundamental elements* must be controlled during composting, which is *the same regardless of the operation or program size*.

- 1) **Carbon to Nitrogen Ratio.** Two primary nutrients obtained by organisms during decomposition of organic matter are carbon for energy and nitrogen for growth. The ideal carbon to nitrogen (C:N) ratio, by weight, is 30 parts carbon to 1 part nitrogen.
- 2) **Particle Size.** Since decomposition generally occurs on or near the surface of organic matter, decreasing the size of bulky material by grinding, shredding, or chopping effectively increases the surface area. An optimal size for compost material is approximately two inches.
- 3) **Aeration.** Aeration loosens and increases porosity of the compost material, maintaining adequate oxygen levels for organism survival. Typically, a compost pile should be aerated at least once or

twice a month to sustain oxygen levels and prevent anaerobic conditions, which produce odors and other harmful byproducts.

- 4) **Moisture.** The “squeeze test” is used to determine the proper moisture content necessary to maintain a steady decomposition rate. In general, compost material should feel damp to the touch and if squeezed should only expel a few drops of liquid, corresponding to 40 or 60 percent moisture content, by weight.
- 5) **Temperature.** As decomposition progresses, the temperature within the center of the pile will increase rapidly and last for several weeks. Mixing of the compost material will maintain and ensure all material is subjected to temperatures as high as 150 degrees Fahrenheit, which is necessary to guaranty the destruction of harmful pathogens.

Key Elements

Whether composting occurs quickly or slowly depends on several factors including the structure and process utilized. A compost pile should be constructed of loosely stacked layers. The bottom layer should consist of coarse/bulky material, the next layer of organic matter high in carbon, then a layer of organic matter high in nitrogen, and finally a thin layer of rich garden soil or finished compost material to introduce microorganisms. As each layer is placed down, water may be added and the layers should be mixed to increase uniformity and decay mechanism interaction.

The utilization of a particular process depends on the quantities of available organic matter, local climatic conditions, and time and money. The bin, open pile, and windrow are three basic processes used for aerobic decomposition.

- ✓ **Windrow** - compost material is formed into long piles or rows, which may require special mechanical equipment for mixing and turning providing aeration.

- ✓ **Static Aerated Pile** - compost material is formed into a large pile that is insulated with an outer layer, in which no mechanical mixing or other agitation is performed.
- ✓ **Enclosed Vessel** - compost material is placed in a drum or other structure where the aeration, moisture content, and other environmental conditions can be controlled. These include vermicomposting and other commercially available composting bins.

Compost Material

The decomposition of organic matter is inevitable; however, certain material can emit odors and attract pests. Wastes that may pose problems for composting operations include human and animal feces, food wastes that contain bones or that are oily and fatty, diseased and pest infested plants, and weed seeds.

Finished Product

Composting is ordinarily considered finished when the temperature of the composting structure drops and stabilizes to within ten degrees of ambient temperatures. The final product should be dark, crumbly, have an earthy odor, and a uniform texture. Finished compost yields a fertile soil additive, which acts like a slow-release fertilizer adding nutrients and enhancing soil structure by improving drainage, porosity, and texture. General uses of compost include potting mix, gardening, agricultural, landscaping, landfill cover, topsoil for roads or construction sites, and/or prevention of soil erosion.

Composting in the AF

The U.S. Air Force recognizes composting as a sound technology for diverting solid waste from landfills and processing organic material, with potential economical benefits. Installations incorporate composting measures into base contracts and implement/fund the following initiatives in accordance with AFI 32-7001:

- 1) Backyard Composting - supporting compost initiatives by military family housing members. Refer to AFI 32-6001 for additional guidance.
- 2) Municipal or Community Composting - the participation and utilization of a local and/or state established composting program.
- 3) On-site Composting - the establishment of a installation composting program. Prior to establishing an on-site composting operation, installations are required to consider waste stream composition, siting, equipment, and manpower.

For Additional Information...

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Websites:

- Environmental Quality Directorate, HQ AFCEE, <http://www.afcee.brooks.af.mil/AFCEEhome.asp>
- Defense Environmental Network and Information Exchange (DENIX), <https://www.denix.osd.mil/>
- Composting, U.S. EPA, <http://www.epa.gov/epaoswer/non-hw/compost/index.htm>
- U.S. Composting Council, <http://www.compostingcouncil.org/index.cfm>

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